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Uncertainty Triggers Overreaction: Evidence from Corporate Takeovers

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Abstract

Behavioural finance models suggest that under uncertainty, investors overweight their private information and overreact to public signals. We test this theoretical prediction in an M&A framework. We find that under high information uncertainty, when investors are more likely to possess firm-specific information, acquiring firms generate highly positive and significant gains following the announcement of private stock and private cash acquisitions (positive news) while the market heavily punishes public stock (negative news) deals. On the other hand, under conditions of low information uncertainty, when investors do not possess private information, the market reaction is complete (i.e. zero abnormal returns) irrespective of the type of acquisition. Overall, we provide empirical evidence that shows that information uncertainty plays a significant role in explaining short-run acquirer abnormal returns.

JEL Classification: G14, G30, G34

Key Words: Information Uncertainty, Private Information, Investor Sentiment, Takeover Gains

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1. Introduction

This paper introduces a behavioural framework for merger and acquisitions (M&As) and investigate announcement acquirer returns in an environment of information uncertainty and private information¹. This empirical research study is motivated by the theoretical behavioural finance models of Daniel et al. (1998, 2001). More specifically, theory pertains that if an investor trades on private signals and at a later stage a public signal confirms his/her initial private information, then his/her confidence rises. Hence, the literature conjectures that even if an individual initially does not suffer from any bias, a supporting public signal of their private information will contribute to higher levels of overconfidence leading to an overreaction, consistent with psychological evidence of confirmation bias impacting decision making (Klayman and Ha, 1987; Jonas et al., 2001). Evidence shows that this initial overreaction is corrected and reversed in the long run as further public signals drive prices back towards their fundamental level. Hirshleifer (2001) and Zhang (2006) show that the psychological bias of overconfidence² increases under conditions of information uncertainty when the firm's value is difficult to estimate. Furthermore, Zhang (2006) empirically shows that under conditions of uncertainty, good (bad) news generates relatively higher (lower) abnormal returns while when uncertainty is low, there is less market predictability. It is intuitive to believe that there should therefore be an impact of investor uncertainty on acquirer returns.

We employ the above theoretical and empirical predictions in an M&A framework contributing with an alternative perspective of how information uncertainty can affect acquirer abnormal returns. It is agreed that acquisition announcements convey information to

¹ By private information, we refer to information collected by individual investors based on personal research. We employ synchronicity as a proxy for private information. An extensive discussion is provided in Section 3.3. By information uncertainty, we adopt the terminology of Zhang (2006) and refer to ambiguity of new information regarding the firm value. This ambiguity emanates from the volatility of firm's underlying fundamentals.

² Investor sentiment is used as an alternative term of investor overconfidence.

the public market, principally signalling positive or negative news regarding the intrinsic value of the acquiring firm. In particular, there is substantial evidence (Myers and Majluf, 1984; Travlos, 1987; Chang, 1998; Draper and Paudyal, 2006) that suggests that the target firm's listing status and the payment method used signal different information concerning the valuation conditions of the acquiring firm. For instance, Travlos (1987) suggests that investors will perceive the announcement of a stock offer for a public target as bad news since the market infers that the acquiring firm is likely to be overvalued leading to a lower re-evaluation. On the other hand, Chang (1998) suggests that when we control for the listing status of the target, then positive information can be relayed to the market if a private target is to be acquired using stock given typical ownership characteristics of such firms that indicate the potential creation of a blockholder in the combined firm (something that is argued to provide an incentive for the private target to ensure the stock is not overvalued). Hence private stock acquisitions would lead to a greater re-evaluation of the acquirers' share price. While this has been unanimously agreed upon, little has been studied over the influence of information uncertainty upon investor reactions to M&A announcements. Financial markets are rife with uncertainty. Rumours over potential merger activity filter into markets on a daily basis, and with Shiller (2003) arguing that animal spirits are playing a growing role in security returns, the investor impact of uncertainty is clearly becoming of increasing importance to understand.

In the context of M&A, we propose that acquirer returns are likely to be exaggerated at times when the firm is subject to information uncertainty. Following previous theory, investors trading under uncertainty are expected to overreact and generate highly positive (negative) abnormal returns following the announcement of private stock (public stock) acquisitions which convey positive (negative) signal to the market. On the other hand, in the absence of information uncertainty, it is expected no market reaction.

We study the UK market as it is one of the largest capital market and one of the most active M&As countries. Faccio and Masulis (2005) document that UK acquirers account for 65.3% of all European deals, while the UK is the second most-active takeover market in the world aside from the US. Together, these reflect our motivations to study the UK market.

Methodologically, we capture information uncertainty using four well-known proxies, including: age, size, number of analyst and trading volume. To test whether investors are more likely to possess private information or not, we also employ stock price synchronicity as introduced by Roll (1988) and further developed by both Morck et al. (2000) and Chen et al. (2007). Roll (1988) suggests that a low R^2 value should be observed in periods of no public news about the firm, indicating that the price movement is triggered by private information. Chen et al. (2007) among others³ adopt synchronicity as a measure of stock price informativeness and show that there is a strong positive relationship between the amount of private information within stock prices and the sensitivity of corporate investment to stock prices. Roll (1988) claims that the measure of stock price nonsynchronicity is not correlated with public information and thereby serves as a good approach to capture private information. In Roll's own words, "*the financial press misses a great deal of relevant information generated privately*" (Roll, 1988: 564).

The results suggest that under conditions of high information uncertainty and when investors are more likely to possess private information, announcements of takeovers which signal positive news for the acquiring firm's intrinsic value (i.e. private stock deals) generate highly positive abnormal returns while takeovers which convey negative news (i.e. public stock) suffer high losses. On the other hand, when uncertainty is lower and investors are likely to possess private information (high synchronicity), zero economical and statistical abnormal returns are obtained irrespective of the type of the deal. Specifically, while previous

³ Morck et al. (2000), Durnev et al. (2003), Durnev et al. (2004), Jin and Myers (2006), Fernandes and Ferreira (2008), Ferreira et al. (2008)) have used stock price nonsynchronicity to examine price informativeness.

literature (Travlos, 1987; Chang, 1998; Fuller et al., 2002) reports positive (around about +2%) abnormal returns for private stock deals and negative (around about -2%) abnormal returns for public stock deals, we shows that this picture is magnified under conditions of uncertainty and is overblown when we control for private information as well. On the other hand there is no market reaction (zero abnormal returns) when investor sentiment triggered by uncertainty is low. In other words, uncertainty seems to act as magnifying glass which ‘magnifies’ the initial picture of the overall sample and prior evidence. These finding are consistent across all four proxies used to capture uncertainty. Buy-Hold Abnormal Returns (BHARs) 48 months post the announcement of the takeover indicate a reversal in the long-run, further supporting that the initial announcement performance was driven by overreaction and investor sentiment.

This paper contributes to the corporate and behavioural finance literature in several ways. First, this is the first paper to our knowledge that applies information uncertainty and private information (as measured using synchronicity) in an empirical M&A framework, thereby offering a behavioural approach in explaining short-run acquirer gains. Previous studies assume that the market is semi-strong efficient and short-run acquirer gains captures either potential synergy or revaluation gains. We offer evidence that the findings of Travlos (1987) and Chang (1998) may be driven by high investor sentiment. Second, this paper contributes to the behavioural finance literature by empirically examining the propositions of Daniel et al. (1998). Third, it shows that in the absence of the signalling effect public stock acquisitions are not value destructive investment decisions. Finally, it offers further evidence that the market reacts asymmetrically following the announcement of positive and negative signals.

The remainder of this paper is structured as follows. Section 2 presents research design and develops the research question; Section 3 describes the data and methodology. Section 4

analyses the empirical findings before Section 5 summarizes the conclusions of the investigation.

2. Research Design and Testable Hypotheses

2.1 Acquisitions Re-evaluation Effect

The method of payment used to finance the transaction; along with the public/listing status of the target firm are of the major deal characteristics that can help to explain acquirers' announcement performance. Derived from the seminal work of Myers and Majluf (1984), the signalling literature suggests that managers who believe that their firm's stock price is undervalued will prefer to finance a potential acquisition with cash while when they consider that their stock price is overvalued, they will prefer to conduct equity transactions to capitalize upon this overvaluation⁴. Travlos (1987) suggests that investors will perceive the announcement of an equity offer for a public target as bad news leading to lower re-evaluation of the acquirers' share price. Takeovers are major corporate events that convey information regarding the prospects and managerial views of the firm value to the market. In this way, the private information of the manager enters the public spectrum of the market at the time of a acquisition announcement, predominantly via the manager's financing choice.

Conversely, Chang (1998), and Draper and Paudyal (2006) report a positive market reaction to the acquisition of private targets to be financed using equity. In these circumstances whereby the target firm is privately held, investors interpret such announcements as good news and this for several reasons. Primarily, unlisted firms tend to be owned by a small number of owners and hence these individuals are portrayed as having a stronger incentive to carefully examine the true value of the acquirers stock. If they believe it to be overvalued, then it would be an irrational act for these owners to accept the acquirer's

⁴ Shleifer and Vishny (2003) provide a model in which acquisitions are driven by firm-misvaluation. They support the idea that overvaluation provides an incentive to acquire a less overvalued target using equity.

equity as payment for their firm. Therefore, it is highly unlikely that the owner of the privately held firm will accept stock if they believe it to be overvalued as they will effectively 'lose-out'. Considering this, private stock acquisitions can be classified as positive announcements given the acceptance of the acquirer's stock by the unlisted target, relaying a signal to the market that the acquirer's stock price must not be overvalued leading to a greater re-evaluation of the acquirer's share price. A cash acquisition for a private firm is usually considered a positive announcement as well but in truth, such an event does not reveal a lot of information regarding the acquirer's intrinsic value in this setting. A reasonable assertion to make is that an acquirer paying for an unlisted target with cash may be less uncertain regarding the level of potential synergy gains that can be extracted from the proposed combination and as such is confident enough to offer cash. This loosely infers that the acquirer is confident, as they may be motivated to avoid the issuance of equity so as to avoid sharing potential synergy gains with the ownership of the target firm⁵. Therefore, a cash acquisition does not directly reveal information about the acquirer's stock value but can, in general, be classified as a relatively positive piece of information.

2.2 Behavioural Finance Models

Honing in on behavioural finance, there is a plethora of literature that continues to grow in both popularity and size. Of late, research interests have typically centred on the resultant effects of information uncertainty. This paper takes note of this rising school of thought and offers a behavioural perspective to help explain short-term acquirer abnormal returns, a topic which has attracted much debate (Chang, 1998; Shleifer and Vishny, 2003; Bouwman et al.,

⁵ The issue of equity to an unlisted target's owners would result in the creation of blockholders in the combined entity.

2009). Experimental evidence shows that investors tend to overestimate the precision of their information, especially in cases where they have been personally involved in the collection of this information (Odean, 1999)⁶. Daniel et al. (1998) support this prediction and suggest that investors are overconfident about the private information they hold. When this private information is confirmed by a public signal, then these investors become more confident and are modelled to subsequently overreact to public information stimulus.

Additionally, Daniel et al. (1998, 2001) also claim that investors become even more overconfident under conditions of information uncertainty. A large part of the psychology literature⁷ suggests that individuals overvalue their own abilities in the decision making process whilst also overestimating the precision of the outcome of the decision made⁸. Investors undoubtedly extract information from various sources (for example, from financial statements, the press and rumours amongst others). However, if they overestimate their own ability to extract this information, or they overweight the precision and significance of this information, then the resultant effect will be an overreaction due to the underestimation of the forecast error involved in the decision-making process. Daniel et al. (1998) define overconfident investors as those who overestimate the precision of their private information as opposed to the public signals available. They find that overconfident investors who possess private information will overweight this information, leading to a stock price overreaction. When an investor trades on his/her private information/signals and subsequently receives a public signal that serves to confirm the trading strategy being executed, then the investor's confidence will rise. One of the advantages of the model of Daniel et al. (1998) when

⁶ Odean (1999) claims that there is excessive trading in equity markets. He explains this as a result of investors who are overconfident. Markets, in turn, become affected by this psychological bias as investors inevitably trade a lot because they repeatedly feel the gains they earn are not enough. Interestingly, securities purchased by overconfident investors are found to underperform those they sell supporting that overconfidence destroys value and leads to excessive trading volumes.

⁷ See, for example, Griffin and Tversky (1992), Greenwald (1980), Svenson (1981), Cooper et al. 1988, Taylor and Brown (1988).

⁸ Hirshleifer (2001) suggests that psychological biases grow both under conditions of greater uncertainty, in the absence of accurate feedback about fundamentals.

compared to previous behavioural models⁹ is that it assumes that investors become overconfident about private signals and therefore allows for both over- and under-reaction effects. Furthermore, the authors claim that since the model is mainly based on both private information and subsequent under or overreaction, its predictive power will be more evident for firms with higher information uncertainty.

Zhang (2006) also suggests that investor overreaction should be more prominent under conditions of information uncertainty since investors become more overconfident for firms that are hard to value. He finds that under conditions of information uncertainty, announcements of good news generate relatively higher abnormal returns while announcements of bad news generate relatively lower abnormal returns. While Zhang (2006) controls only for information uncertainties, he does not include private information into his analysis, proposing that further investigation is required.

2.3 Our Framework and Testable Hypotheses

In this paper, we test the theoretical predictions of the behavioural models within a M&A framework. More specifically, we empirically investigate the acquirer announcement market reaction for the various types of takeovers under conditions of information uncertainty and private information. To capture information uncertainty, we employ four different proxies used in the literature such as age, size, analysts and trading volume. Young, small, low trading volume and/or acquiring firms followed by a small number of analysts are more likely to be subject to information uncertainty. For private information, we employ an established measure, namely synchronicity, introduced by Roll (1988). The lower the co-variation of the acquiring firm's share price with the market and/or industry index, the more likely it is that

⁹ Kyle and Wang (1997), Odean (1999) and Wang (1998) define overconfidence as overestimation of information precision regardless of whether the information is private or public.

the acquiring firm's share price will be moving due to firm-specific rather than market-wide information.

Following this discussion above, we form the following predictions:

Prediction 1: For acquires subject to high information uncertainty i.e. young, small, low trading volume and/or acquirers followed by a small number of analysts and for which investors are more likely to possess private information i.e. low synchronicity, the market is expected to overreact positively following the announcement of acquisitions of private targets paid for with equity or cash.

Prediction 2: For acquires subject to high information uncertainty i.e. young, small, low trading volume and/or acquirers followed by a small number of analysts and for which investors are more likely to possess private information i.e. low synchronicity, the market is expected to overreact negatively following the announcement of acquisitions of public targets paid for with equity.

Under high information uncertainty conditions (i.e. young, small, low trading volume and/or acquirers followed by a small number of analysts) and when investors are more likely to possess private information (i.e. low synchronicity stocks), investors are more likely to overreact upon the announcement of a takeover deal. Investors will overreact and generate highly positive abnormal returns following the announcement of acquisitions which signal 'good' news – i.e. private targets financed with cash or stock, and public targets financed with cash. Under the same conditions, the market reaction will be highly negative following announcements of takeovers which signal 'bad' news – i.e. public targets paid for with stock.

Prediction 3: For acquires subject to low information uncertainty i.e. old, large, high trading volume and/or acquirers followed by a large number of analysts and for which investors are less likely to possess private information i.e. high synchronicity, the market reaction is expected to be complete (zero abnormal returns) following the announcement of any

acquisition, irrespective of the target's public status (private or public) or the method of payment (cash or stock).

When information uncertainty conditions are expected to be low (i.e. old, large, high trading volume and/or acquirers followed by a large number of analysts) coupled with investors who are less likely to have collected private information (i.e. high synchronicity), then the market reaction is expected to be complete (i.e. zero abnormal returns).

3. Sample Selection, Data and Methodology

3.1 The Sample

The sample consists of takeover announcement deals undertaken by UK acquiring firms for the period between 01/01/1985 and 31/12/2008. The announcement dates for each deal were sourced from Thomson Security Data Corporations (SDC). For inclusion into the final sample, the following deal criteria was set:

- o The acquirer is a U.K. firm publicly traded on the London Stock Exchange (LSE) with five days of return data available around the announcement date of the takeover as well as available data for three years Buy-and-Hold Abnormal Returns (BHARs) from the DataStream database.
- o The target company is either a listed or private company and can be a domestic or a foreign company.
- o The acquisition was financed wither by 100% equity or 100% cash
- o The acquiring firm purchases at least 50% of the target's shares.
- o The deal value is £1 million or more.
- o The deal value represents at least 1% of the market value of the acquirer.
- o Multiple deals announced within a 5 day period are excluded.

The initial sample from Thompson One Banker was 20,306 deals and after the exclusion of deals according to the above criteria, our final sample totaled 1,839 deals. Of these deals, 1,409 were for takeovers of private targets and 430 were for public firms. Our study focuses especially on Private Stock and Public Stock which signal the strongest positive and negative signals respectively.

Table 1 reports the descriptive statistics for the final sample. The median age of acquirers is around 12.97 years and the median size of acquirers is around 170.17 million pounds. Half of the acquirers are followed by 4 or analysts of more and the median deal size of our sample is 12.75, inferring that around half of the deals conducted have are between £1 and £12.75 million in size. In addition, the relative size of the target firm over that of the acquirer is 8.22% indicating that target firm are quite relative sizeable and would have a significant impact on acquirers. Panel B reports that there is an almost even divide between the numbers of diversified transactions to non-diversified ones and domestic acquisitions slightly exceed cross-border ones. Panel C reports the number and percentage of acquirers per industry. The Other & Unclassified describes data that for which no data is provided by DataStream or SDC as well as financials and utilities. Since this is a study with a behavioural approach, we had no particular reason to exclude those deals. This information is not directly influential over our analysis in regards to the key research objectives of this paper and thus they remain in the sample.

[Insert Table 1 about here]

3.2 Measures of Information Uncertainty

In order to capture information uncertainty, we employ four proxies recommended within the literature. The first measure employed is *Age*. The existing literature suggests that the younger the firm is, the higher the amount of uncertainty there will be regarding the

firm's value (Zhang, 2006; Jiang et al., 2005; Barry and Brown, 1985). Young firms are associated with a lower amount of information dissemination and thus the age of the firm can be used as a proxy for the level of information uncertainty surrounding its value. We measure age as the difference between the date of incorporation of the firm and the date of the announcement of the acquisition.

Size is the second proxy employed in order to capture information uncertainty regarding the acquirer's value. Smaller firms are less likely to disclose a lot of information and are less diversified than larger firms. However, small firms also have a lower number of suppliers, investors and customers and therefore the accessibility of information can be more difficult. Hence, small size firms are more likely to be associated with a higher degree of information uncertainty (Zhang, 2006). We measure size as the Market Value (MV) of the acquiring firm 20 days before the announcement of the acquisition.

Analyst Coverage is the third proxy used to capture information uncertainty. The role of analysts is to collect, analyze and distribute information about the company's performance. The lower the number of analysts following a firm, the smaller the amount of available information about the specific firm. Zhang (2006) and Hong et al. (2000) use this approach as a measure of information uncertainty. Analyst coverage is measured as the number of analyst following the acquiring firm the year prior to the announcement of the acquisition. Firm followed by less than two analysts are classified as subject to high information uncertainty while those followed by two or more are classified as low information uncertainty acquirers.

Trading Volume is the fourth proxy used within this work to measure information uncertainty. Low trading volumes suggest that a lower number of investors are aware or are following the firm. Thus there is likely to be less trading activity associated with the acquirers who exhibit a low trading volume. The trading volume of the acquirer is measured as the

firm's average daily trading volume scaled by the total number of shares outstanding six months prior to the announcement of the acquisition (Jiang et al., 2005).

Table 2 reports the degree of correlation across all four proxies as well as synchronicity. Some of these measures are indeed positively correlated such as analyst coverage with Age or Size. However, other pairs, such as volume with age and/or analysts exhibit very low correlations (Table 2). There is low correlation between synchronicity and age and volume proxies while it is higher for analysts and age. This is quite reasonable as the higher the number of analysts or the larger the firm, the higher the synchronicity. In other words, when more analysts follow a firm, they search and collect private information which they reveal and make it available to the public. Similarly, large firms are more exposed to the market. Hence, there is lower likelihood of investor to possess private info (higher synchronicity).

In addition, Panel B of Table 2 presents the correlation matrix among the control variables are used in the multivariate analysis and there seems to face no serious high correlations among the control variable.

[Insert Table 2 about here]

3.3 Measure of Private Information

Recent models emanating from the school of behavioural finance have focused on the role of private information and its subsequent impact on investors' cognitive biases alongside their following investment decisions. One of the roles of financial markets is to facilitate the production and accumulation of information into stock prices. This occurs through the impact of the trading activities of speculators on stock prices. Financial economists support the notion that stock returns incorporate firm-specific and market-wide information. Roll (1988) claims that stock prices move together depending on the amount of firm-specific or market-wide information impounded in stock prices. He also explains that stock price movements are

influenced by market-wide economic shocks, by industry shocks and by news specific to the firm.

Chen et al. (2007) *suggest that managers learn from the private information incorporated in stock prices and take advantage of this information within their corporate investment decisions.* More specifically, they suggest that private information is incorporated in stock prices through speculators trading activity. An important point to note is that a high level of private information does not imply that stock prices are close to fundamentals. The variation between a stock price and its fundamental value depends on the amount of public information available for that stock as well. The incorporation of private information is a timely procedure and that may imply that stock prices with more private than public information might be further away from fundamentals. Theoretical evidence (Dow and Gorton, 1997; Subrahmanyam and Titman, 1999) suggests that managers can extract useful information hidden in stock prices. Stock prices accumulate a lot of information from various trading participants in the market who do not have any other way of communicating with the firm apart from via the trading process. Consequently, stock prices may incorporate information that managers do not have. Different stocks have different levels of private information incorporated within them due to the various costs involved in the acquisition and production of such information (Grossman and Stiglitz, 1980). Ferreira and Laux (2007) argue that firms with fewer antitakeover provisions for which investors have a higher benefit to search for private information are associated with higher levels of idiosyncratic risk, trading activity and private information flow.

This paper follows Chen et al. (2007) to measure stock price synchronicity. The variation of stock returns can be decomposed into the following components: market-wide variation, industry-specific variation and firm-specific variation. This work needs to capture

the last component of firm-specific variation, which can be measured by the R^2 of the following regression:

$$r_{i,j,t} = \beta_{i,0} + \beta_{i,m} r_{m,t} + \beta_{i,j} r_{j,t} + \varepsilon_{i,t} \quad (1)$$

where $r_{i,j,t}$ is the return of acquirer i in industry j at time t , $r_{m,t}$ is the market return at time t and $r_{j,t}$ is the return of industry j at time t . To construct this regression, weekly returns for a period of 24 weeks (6 months) before the announcement of the acquisition are used.

3.4 Short-Run Event Study Methodology

To calculate the acquiring firms' performance and identify the short-run impact of information uncertainty and private information, we employ standard event study methodology (Fuller et al., 2002) to calculate the Cumulative Abnormal Returns (CARs) for a five-day period $(-2, +2)^{10}$ around the announcement date, as provided by DataStream. We estimate abnormal returns using the modified market model as follows:

$$AR_{i,t} = R_{i,t} - R_{m,t} \quad (2)$$

Where $AR_{i,t}$ is the excess return of acquirer i on day t ; $R_{i,t}$ is the return of acquirer i on day t measured as the percentage change in return index including dividends of acquirer i ; and $R_{m,t}$ is the market return estimated as the percentage change in FTSE All Share Index (value-weighted) on day t . The CARs are calculated as the sum of the Abnormal Returns ($AR_{i,t}$) for the five days surrounding the announcement of the acquisition as per the following equation:

$$CAR_i = \sum_{t=-2}^{t=+2} (R_i - R_m) \quad (3)$$

3.5 Long-Run Buy-Hold Abnormal Returns

¹⁰ We have conducted our analysis using a 3-day window $(-1,+1)$ and the results remain consistent.

If the initial short-run market reaction to takeover announcements was driven by investor overreaction, a price correction should be observed in the long-run. To examine the long-run abnormal stock returns, we employ 48-month buy-and-hold abnormal return (BHAR) approach advocated by Barber and Lyon (1997). The BHAR is computed as:

$$BHAR_i = \prod_{t=1}^T (1 + R_{it}) - \prod_{t=1}^T (1 + R_{mt}) \quad (4)$$

where R_{it} is the monthly return for company i and R_{mt} is the monthly return of the market index.

4. Empirical analysis

4.1 Acquirer Announcement Returns

Table 3 reports the five-day cumulative abnormal returns (CARs) for the full sample by the target's listing status (i.e. private or public) and by the method of payment used to finance the deal (cash or stock). Acquirers which bid for private target firms enjoy positive and significant gains of 1.7% while for acquisitions of targets which are listed firms, acquirers suffer marginally insignificant losses of -0.40%. While the target listing status impacts the returns generated for acquiring firms, the signaling literature indicates that the method of payment used by the acquirer to finance the deal plays a significant role in determining the returns to be experienced. With respect to the method of payment used, acquisitions for private targets paid for with stock (3.80%) enjoy 2.60% (p-value: 0.017) significantly more abnormal returns than those paid for with cash (1.20%) (see Chang, 1998; Ang and Cohers, 2001; Draper and Paudyal, 2006; and Fuller et al., 2002). On the other hand, takeovers for public target firms paid for with equity suffer significant losses (-2.50%) while those paid for with cash generate positive abnormal returns (1.10%). The difference of 3.60% is statistically significant at the 1% significance level (Travlos, 1987). We present these results for two reasons - firstly to show that the picture of the overall sample is consistent with the prior

evidence reported in the literature and secondly, to show how the initial picture of the overall sample changes under the presence or absence of information uncertainty and private information.

[Insert Table 3 about here]

Tables 4 reports the short-term performance of takeovers for private and public targets paid for cash and stock respectively (denoted PrivateCash, PrivateStock, PublicCash and PublicStock respectively) under conditions of information uncertainty as captured by four proxies and private information as captured by synchronicity. Panel A depicts announcement abnormal returns by employing the Age proxy to capture information uncertainty. The younger a firm is, the higher the level of uncertainty there is regarding the firms true value. As outlined earlier, Chang (1998) indicates that PrivateStock acquisitions serve as a positive news to the market that acquiring firm's share price is not overvalued due to the target's acceptance of the acquirer's equity. The overall short-term performance of the PrivateStock portfolio is 3.80% (p-value: 0.000). Under conditions of information uncertainty, PrivateStock deals generate 4.40% abnormal returns while when private information is also incorporated (HiuLs), PrivateStock deals generate even stronger positive abnormal returns of 5.70% (0.005) for the acquirer. On the other hand, under low information uncertainty, the market reaction is lower (2.40%) and when the private information of investors is likely to be lower, the market reaction is almost zero (0.60% insignificant gains). The difference of 2.10% between High and Low information portfolios amplifies to 5.00% (statistically significant: p-value: 0.037) when private information is taken into account. This indicates that the market reaction is fundamentally different between the two states of uncertainty and consistent with the theoretical behavioural finance models. Daniel et al. (1998, 2001) suggest that investors tend to overweight their private information and become even more overconfident under conditions of information uncertainty. When private information is

included, the overconfidence of the investor is likely to become even more intense so that the differences are expected to be amplified. This performance of Private stock deals under conditions of uncertainty seem to be almost 3 times more than the results reported in the literature (Chang, 1998; Fuller et al., 2002). On the other hand, in the absence of uncertainty and private information, private stock deals obtain marginally positive but insignificant abnormal returns (0.60%). That shows that when investors possess a level of private information, there is a highly positive reaction following the announcement of events that signal positive news about the acquiring firm's intrinsic value. On the other hand, when investors are less likely to possess private information and thus have less potential to overestimate its precision, there is no significant market reaction.

[Insert Table 4 about here]

The picture for private acquisitions paid with cash (PrivateCash) is similar to the one described above. PrivateCash deals also convey positive news to the market but less strong than that of PrivateStock deals. The difference between conditions of high versus low uncertainty is positive and significant but to a lower magnitude (1.60%). PublicCash deals seem not to convey neither positive nor a negative signal to the market. For that reason, we observe no economical or statistically significant difference between the two states of the market for PublicCash deals. The discussion will mainly focus on PrivateStock and PublicStock deals which convey strongly positive and negative signals respectively.

The picture described above is different for acquisitions for public target firms paid for with equity (PublicStock). PublicStock acquisitions signal negative news to the market regarding the intrinsic value of the acquiring firm's value. In the overall sample, PublicStock deals generate significantly negative losses of -2.50% (p-value: 0.000) for the acquiring firm.

When we control for uncertainty, the negative performance becomes even more negative (-3.30%) under conditions of high information uncertainty. When private information is also

incorporated, the performance of PublicStock deals amplifies even more (-3.70%). On the other hand, it declines to -1.20% under low uncertainty and even lower to -1.00% (0.423) under lower information uncertainty and no private information. The difference between the two states of the market is 2.70% and statistically significant (p-value: 0.098). This evidence is also consistent with the theoretical behavioural finance models of Daniel et al. (1998, 2001). The market over-reaction lead PublicStock deals to even more negative short-run abnormal performance.

The findings described above can be visualized in Figure 1. The first column of each group shows the cumulative abnormal returns for the overall sub-portfolios, which is consistent with existing empirical literature. The second column depicts the market reaction to takeover announcements when information uncertainty is high while the third column represents the cumulative abnormal returns for the portfolio in the absence of uncertainty and private information. It is clear that under conditions of uncertainty, there is a market overreaction. There is a highly positive reaction for positive-signaling deals (i.e. PrivateStock and PrivateCash) and a highly negative one for those takeovers signaling negative news (i.e. PublicStock). On the other hand, in the absence of uncertainty and private information, the market reaction is complete (i.e. zero abnormal returns), as displayed in the third column for each of the four sub-portfolios.

[Insert Figure 1 about here]

For robustness, we conduct this analysis using a further three proxies, namely size, analysts and trading volume in order to capture information uncertainty. The results are provided in Panels B, C, and D respectively. The overall picture for the four types of acquisitions (i.e. PrivateStock, PrivateCash, PublicStock and PublicCash) remains highly similar to the evidence indicated by the age proxy and the findings remain consistent across all four proxies.

The results for the overall portfolios are consistent with the evidence reported in the prior literature (Travlos, 1987; and Chang, 1998). When we allow for investor sentiment to enter the picture, we observe a positive (negative) overreaction following the announcement of positive (negative) signaling takeovers. This evidence is consistent with the theoretical work of Daniel et al. (1998, 2001) and Hirshleifer (2001). Zhang (2006) also reports similar evidence. He empirically shows that under conditions of uncertainty, good (bad) news generates relatively higher (lower) abnormal returns while when uncertainty is low, there is less market predictability. At this point, we need to make it clear that this paper does not argue that the whole acquirers' announcement reaction is driven by behavioural biases. Synergies, timing and other factors may be determining factors in relation to the short-run quality of a takeover deal. This study investigates how the *re-evaluation* of the acquiring firm (positive or negative) is conveyed to the market through the announcement of an acquisitions can be interpreted under conditions of high and low investor sentiment.

Another important point to note is related to potential risk-based explanations for the results. One might argue that the proxies used to capture information uncertainty could also be used as risks factors. However, we feel our results fall more in line with the behavioural story presented in this paper rather with a neoclassical approach. Primarily, neoclassical explanations suggest that high risk acquirers should be associated with high returns. This is the case of PrivateStock, PrivateCash and PublicCash (positive signalling) acquisitions but exactly the opposite is observed for PublicStock (negative signalling) deals. For public stock deals, the higher the risk (uncertainty), the more negative the returns are. Therefore this finding gives additional support to the behavioural (uncertainty) story, rather with to the

rational (risk) story. In addition, we control for the potential effects of risk by employing the Fama-French 3 factor model¹¹.

4.2. Multivariate Analysis

The existing M&A literature has documented a number of different factors that can affect the performance of acquiring firms, such as book-to-market (Rau and Vermaelen, 1998), relative size (Fuller et al., 2002. Croci et al., 2010), total assets, leverage, cash-to-assets (Faccio and Masulis, 2005) and industry diversification (Doukas and Kan, 2004).

To examine whether differences in acquirer and deal characteristics explain the abnormal return differentials, we adopt a multivariate regression framework whereby announcement period returns for acquirers are regressed against a set of explanatory variables that have been proven in the literature to affect acquirers' performance. Moreover, the multivariate framework enables us to overcome issues related to the small number of observations in some portfolios¹².

[Insert Table 5 about here]

In all regressions we include the following control variables: the acquirer's book-to-market value, which is measured by the acquirer's net book value of assets divided by its market value one month before the announcement of the deal; the deal's relative size, which is measured as the ratio of the deal value over the acquirer's value; the logarithmic form of acquirer's total assets as measured the year prior to the acquisition announcement; Leverage is measured as acquirer's long term debt divided by the market value of equity the year prior to the acquisition announcement; Cash-to-Assets is measures as acquirer's cash prior to the year of the announcement scaled by its total assets; a dummy variable for diversifying deals

¹¹ The results of these examinations are not reported in this work but are available upon request, and simply serve to reinforce the results reported in Table 4.

¹² There are a relatively low number of acquisitions for public targets paid for with equity in the UK.

which takes the value of 1 when the acquirer's two-digit SIC code is different from that of the target, and zero otherwise; and a dummy variable that takes the value of 1 if the target is a domestic firm.

For brevity, we present the multivariate analysis only for PrivateStock and PublicStock deals which signal the most positive and negative news respectively. The results for PrivateCash and PublicCash deals follow similar patterns to the evidence discussed here for PrivateStock acquisitions. Panel A of Table 5 presents the results for the Age proxy. In regressions (1), we include a dummy variable (High) that takes the value of 1 if the deal is classified as high uncertainty, a dummy variable that takes the value of 1 if a deal involves the acquisition of a private target and financed by equity and zero otherwise (PrivateStock) as well an interactive variable of PrivateStock times High which would capture the impact of information uncertainty on private stock deals. In all regressions, our focus is on the interactive variable. The interactive variable in regression (1) is positive and significant (0.024). In regressions (2), we include a dummy variable that takes the value of 1 if the deal belongs in the high uncertainty and low synchronicity group (HiuLs) as well an interactive variable of PrivateStock times HiuLs which would capture the impact of states of information uncertainty and private information for private stock deals. When along with information uncertainty, we incorporate private information in regression (2), the interactive variable becomes even more positive (0.036) and more significant providing further support to the findings presented in the previous section. This finding remains robust when we proxy information uncertainty with other three proxies (see regressions (5), (6), (9), (10) and (13), (14) in Panels B, C and D respectively). Under uncertainty, investors overweight their private information and we observe a significant positive relationship between CARs and high levels of private information. A negative overreaction is observed in regressions (3), (7), (11) and (15) for PublicStock deals under high information uncertainty. The interactive dummy

variable ($\text{PublicStock} \times \text{High}$) carries a negative and significant coefficient indicating that under conditions of information uncertainty, the market reacts even more negatively for public stock deals. In regressions (4), (8), (12) and (16), where we combine information uncertainty and private information, the interactive variable ($\text{PublicStock} \times \text{HiuLs}$) becomes even more negative and significant. The results are robust among all four proxies for information uncertainty. The multivariate analysis offers supportive evidence to the conclusions drawn from the univariate analysis. In absolute term, the interactive variable for public stock acquisition is higher than that of private stock indicating an asymmetric response to positive and negative news. These finding is consistent with Epstein and Schneider (2008) and Bernard et al. (1997) find significant differences in the markets response with regards to receiving a signal of good and bad news.

4.3 The impact of Disclosure on Stock Price Synchronicity

Throughout this paper, we take the view of Roll (1988), among others, who claims that the measure of stock price nonsynchronicity is not correlated with public information and thereby serves as a good approach to capture private information. Synchronicity captures firm-specific information. Given that for UK public firms (our sample of bidders), transparency and disclosure is more homogenous compared to other countries, we made the wider assumption, that variation in stock price synchronicity is more likely to capture and be driven by private information collected by investors. Jin and Myers (2006) and Gul, Kim and Qiu (2010) argue that synchronicity is higher in less developed economies with poorer corporate governance. In such markets, synchronicity is likely to capture, apart from private information, public firm-specific information as well.

Despite our initial assumption, for robustness reasons, we acknowledge that the measure of synchronicity may capture public firm-specific information. To deal with this issue, we

construct a measure of disclosure to control for that issue. Vast financial accounting literature discusses disclosure and measures that could proxy for that. We follow a UK study by Mouselli et al. (2012) who argue that accrual quality is positively associated with disclosure since firms with higher disclosure quality are less likely to engage in earnings management and therefore have higher accruals quality.

To calculate Abnormal Working Capital Accruals (AWCA), we follow Marra et al. (2011). AWCA is calculated for each bidding firm at the end of the year before the announcement date as follows:

$$AWCA_t = WC_t - \left[\left(\frac{WC_{t-1}}{S_{t-1}} \right) S_t \right]$$

Where t is the year end before the acquisition announcement, AWCA is the Abnormal Working Capital Accrual; WC is the non-cash working capital and is calculated as Current Assets minus cash and short term investments minus current liabilities plus short-term debt. S is Total Sales. AWCA is scaled by Total Assets¹³.

To control for information emanating from the firm through various disclosure mechanisms, we regress the above disclosure measure on synchronicity and we keep the residual. The variation in synchronicity that cannot be explained by disclosure (public information) is more likely to represent private information. In this way, we cleaner a cleaner measure for private information. In this section and in Table 6, we use this cleaner measure of synchronicity to capture private information. The results are robust and hold. Table 6 presents evidence similar to Table 5. Actually, our results become even stronger. The interactive variable for private stock deals (PrivStock*HiuLs) becomes even more positive and significant while the interactive variable for public stock deals (PublicStock*HiuLs) becomes even more negative and significant as compared to the regression where we have not incorporated private

¹³ We have tried different variations of this measure, such as not scaling by total assets, or by taking the absolute value of AWCA as in Marra et al. (2011) and the results are robust

information (see table 5 in the paper, regressions 1, 3, 5, 7, 9, 11, 13 and 15) as well as compared to the regressions where we use raw synchronicity as a proxy of private information (see table 5 in the paper, regressions 2, 4, 6, 8, 10, 12, 14 and 16)

[Insert Table 6 about here]

4.4 Long-Run Performance

If this initial short-run market performance is driven by investor overreaction, as we argue so far, a long-run reversal should be observed in the long-run. Table 7 presents a multivariate analysis with exactly the same variables used in table 5 for Buy-Hold Abnormal Returns (BHARs) for 4 years (48 months) post the announcement of the takeover. Results show that the initial overreaction disappears and reverses in the long-run. The interactive coefficient for private stock deals becomes negative and significant for most proxies of information uncertainty. The same applies for public stock deals. The interactive coefficient for public stock deals becomes positive and significant in the long run indicating that the short-run negative overreaction is reversed. In unreported results, we test various post announcement event windows such as 3, 6 and 12 months as well as 2, 3 and 4 years. The results for the period up to 1 year show a price continuation (positive for private stock and negative for public stock deals) after the announcement date which disappears in year 2. There is weak evidence of reversal in year 3 and slightly stronger evidence of reversal in the reported results in Table 7. Our findings are consistent with the theoretical predictions of Daniel et al. (1998) who argue that investors' biases cause overreaction and momentum in stock prices which is finally reversed. This picture reinforces our initial argument that a large part of the short-run announcement abnormal returns have been driven by investor overreaction.

[Insert Table 7 about here]

5. Conclusion

This paper examines the market response to the re-evaluation effect of takeover announcements. We adopt a behavioural approach within a UK sample set under conditions of information uncertainty and private information. More specifically, we examine the short-term acquirer gains controlling for information uncertainty regarding the acquirer and the effects of the deal, as well as the level of the investor's private information in the surrounding environment of the acquirer.

The main findings suggest that under conditions of high information uncertainty and when investors are more likely to possess private information, announcements of takeovers which convey positive news concerning the acquiring firm's intrinsic value (i.e. PrivateStock and PrivateCash deals) generate highly positive abnormal returns. Under the same conditions, takeovers which signal negative news (i.e. PublicStock) suffer high losses. On the other hand, when uncertainty is lower and investors are less likely to possess private information (i.e. high synchronicity), zero economical and statistical abnormal returns are obtained irrespective of the type of the deal undertaken.

This evidence is consistent with the theoretical work of Daniel et al. (1998, 2001) who suggest that investors are overconfident and overreact to public announcements under conditions of uncertainty. Furthermore, they claim that investors, due to a self-attribution bias, become even more overconfident about their own private information following the public announcement and overreact even more. Consequently, under uncertainty, investors with private information react highly positively following the announcement of good news (i.e. PrivateCash, PrivateStock) while they react very negatively following the announcement of bad news (i.e. PublicStock deals). When there is low uncertainty and investors do not possess private information, the market reaction is complete.

Overall, this paper offers a behavioural explanation for the market reaction following takeover announcement. Even after controlling for risk factors by employing the classical Fama-French 3 factor model, our results are robust and consistent with our behavioural explanations. The short-run market reaction to M&As announcements reflects either potential synergy and/or revaluation gains. Our evidence suggests that there is a market overreaction driven by investor biases. Investors' biases increase especially with uncertainty and will also depend on the type of news conveyed by each type of takeover. Investors will react either highly positively or negatively with private information following a positive or negative news respectively. In the absence of uncertainty, the market reaction is complete.

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